

## PATENT SPECIFICATION



Application Date: Nov. 18, 1936. No. 31628/36.

484,929

Complete Specification Left: Sept. 7, 1937.

Complete Specification Accepted: May 12, 1938.

## PROVISIONAL SPECIFICATION

## Improved Perforated Rubber Sheeting and method of producing the same

We, FORDYCE CHARLES JONES, a British subject, of 27, Lots Road, Chelsea, London, S.W.10, and EDWARD LUMSDEN, a British subject, of 4, Vernon Place, Southampton Row, London, W.C.1, do hereby declare the nature of this invention to be as follows:—

This invention relates to an improved form of perforated rubber sheeting and to a method of producing same.

It is known to mould perforations in sheets of rubber while in the plastic state and before or during the stage of vulcanisation and final solidification. According to the present invention rubber sheeting is produced which is characterised in that it is formed with moulded perforations spread over its area and in addition an ornamental pattern or design on one or both sides. In the method of production, the moulding of the perforations is carried out by suitable dies adapted to be pressed together, one of said dies being a matrix to receive the points of perforating pins carried by the coacting die, and one or both dies is or are made with an engraved or otherwise formed pattern so that the perforating and patterning operations are effected simultaneously.

According to one way of carrying the aforesaid method into practice, a flat moulding apparatus is used. This apparatus comprises essentially a lower die plate from which extend a plurality of upstanding perforating pins disposed in uniformly spaced lines running at right angles to one another. The spacing may be of any dimension to suit requirements, e.g. four or five perforations to the inch or more, but the invention is not restricted to any particular spacing. The lower die plate is also formed with an ornamental pattern of any character desired; for instance, it may be an imitation basket weave or some other substantially regular

geometrical design so that the perforations are regularly disposed in some definite relationship with the design. This, however, is a matter of taste and depends upon the use to which the sheet is to be put. Coacting with the lower die is an upper die plate formed as a matrix with recesses to register with the points of the perforating pins. The plastic sheet is laid upon the lower die and the upper matrix pressed in position. Heat may be applied to vulcanise or partly vulcanise *in situ*.

A rolling system of moulding perforations and patterns may be used. One example of such a system comprises a die roll working with a matrix roll and between the two rolls the plastic sheet is fed. The die roll carries the perforating pins and is formed with the pattern, whilst the matrix roll is formed with recesses to register with the perforating pins. A third roll somewhat similar to the matrix roll may be run in "gear" with the die roll to ensure perfect timing and register. The recesses in this extra register roll may be much deeper than those in the matrix. Whilst the die roll is preferably of metal, the matrix and register rolls may be of vulcanised rubber compound. In this latter instance the recesses therein may be formed whilst the material of the rolls is comparatively soft and unvulcanised, a preliminary run being given to the apparatus so that the die roll will form the recesses. Heat may be applied to the die roll or otherwise at this apparatus to bring about vulcanisation during the perforating and patterning operation; alternatively, especially to speed up the run, the sheet on leaving the apparatus may be conveyed to an independent vulcanising device.

Dated this 18th day of November, 1936.

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[Price 1/-]

Price 4s 6d

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## COMPLETE SPECIFICATION

**Improved Perforated Rubber Sheeting and method of producing the same**

We, **FORDYCE CHARLES JONES**, a British subject, of 27, Lots Road, Chelsea, London, S.W.10, and **EDWARD LUMSDEN**, a British subject, of 4, Vernon Place, Southampton Row, London, W.C.1, do hereby declare the nature of this invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to forms of perforated rubber sheeting and to a method of producing same.

It is known to mould perforations in sheets of rubber which in the plastic state and before or during the stage of vulcanisation and final solidification.

Specification No. 457,203 describes and claims a porous distensible material consisting of a layer of distensible textile fabric such as stockinette or the like and a perforated elastic layer of rubber or the like, the layer of rubber or the like being in the form of a system of interconnected ribs or strips formed by moulding under pressure and simultaneously moulded and united to the fabric, these strips firmly adhering to the fabric and enclosing apertures of which at least 100 are provided per square inch of surface. The outer surface of the rubber may be decorated by providing it with ornamental devices, impressions, grooves, points and the like.

According to the present invention plain rubber sheeting (i.e. having no fabric or other material apart from the usual constituents of the rubber composition) is produced which is characterised in that it is formed with moulded perforations spread over its area and in addition an ornamental pattern or design on one or both sides.

The method of making the patterned rubber sheeting according to the invention comprises introducing the sheeting in its semi-plastic state between a pair of dies, one of which carries perforating pins and the other corresponding recesses to receive the pin ends whereby the sheeting is perforated with moulded holes, and simultaneously applying to one of the (or both) sides of the sheeting an ornamental or other pattern by means of an appropriate engraved or other relief design formed on one of the (or both) dies, the sheeting being subsequently vulcanised or partially or wholly vulcanised whilst between the dies.

The method can be carried into effect by using co-acting flat die-plates, or more conveniently by passing the sheeting between a pair of die rolls.

The patterned and perforated sheeting produced by the method is single ply plain rubber (the word "plain" denoting that no fabric or other material, apart from the usual constituents of the rubber composition, is employed).

By way of example, the invention will be described with the aid of the accompanying drawings in greater detail as carried out by a die-roll pressing method. In said drawings:—

Figure 1 is a diagram of a die-roll pressing machine;

Figure 2 is another diagram showing in an enlarged fragmentary manner the contacting peripheries of the die-rolls according to Figure 1;

Figure 3 shows one face of a piece of sheeting produced by the invention; and Figure 4 shows the back of the sheeting illustrated in Figure 3.

Referring to the drawings, upper and lower die-rolls are marked 1 and 2 respectively. These may be internally heated to produce partial or complete vulcanisation of the sheet 3 passing between them. The feed roll is designated 4 and the wind-off roll 5, whilst the assembly 6 represents a pair of take-up guide rolls pressed together with adjustable pressure.

The die roll 1 carries perforating pins 7 and is also formed with a design in relief such as by engraving over its cylindrical surface, this being indicated in Figure 2 by the patterned periphery 8. The other die-roll 2, i.e. the matrix roll is formed with recesses 9 corresponding to and meshing with the pins 7.

The pins and recesses (7, 9) are preferably disposed in uniformly spaced lines running at right angles to one another so that the sheet 3 is formed with moulded perforations 10 as in Figures 3 and 4. The spacing may be of any dimension to suit requirements, e.g. four or five perforations or more to the inch, but the invention is not restricted to any particular spacing. As mentioned the die-roll 1 is also formed with an ornamental pattern of any character desired; for instance, it may be an imitation basket weave as shown in Figure 3 or some other substantially regular geometrical design so that the perforations 10 may be regularly disposed in some definite relation-

ship with the design, e.g. in the interstices between the simulation interwoven strips. This, however, is a matter of taste and depends upon the use to which the sheet is to be put.

Instead of heating the rolls 1 and 2, vulcanisation may be effected in any other suitable manner. The semi-plastic sheet 3 passing between the die-rolls 1 and 2 will be simultaneously formed with an ornamental or other surface pattern, and the moulded perforations 10.

A third roll 11 somewhat similar to the matrix roll 2 may be run in "gear" with the die-roll 1 to ensure perfect timing and register. The recesses in this extra register roll 11 may be much deeper than those in the matrix 2. Whilst the die-roll 1 is preferably of metal, the working surfaces of the matrix and register rolls respectively may be of vulcanised rubber compound. In this latter instance the recesses such as 9 therein may be formed whilst the material of the rolls is comparatively soft and preferably unvulcanised, a preliminary run being given to the apparatus so that the die-roll 1 will form the said recesses. As already described, heat may be applied to the die-roll 1 to bring about complete or partial vulcanisation during the perforating and patterning operation; alternatively, especially to speed up the run, the sheet on leaving the

apparatus may be conveyed to an independent vulcanising device.

The product produced by the method is a single ply plain rubber sheet as hereinbefore described.

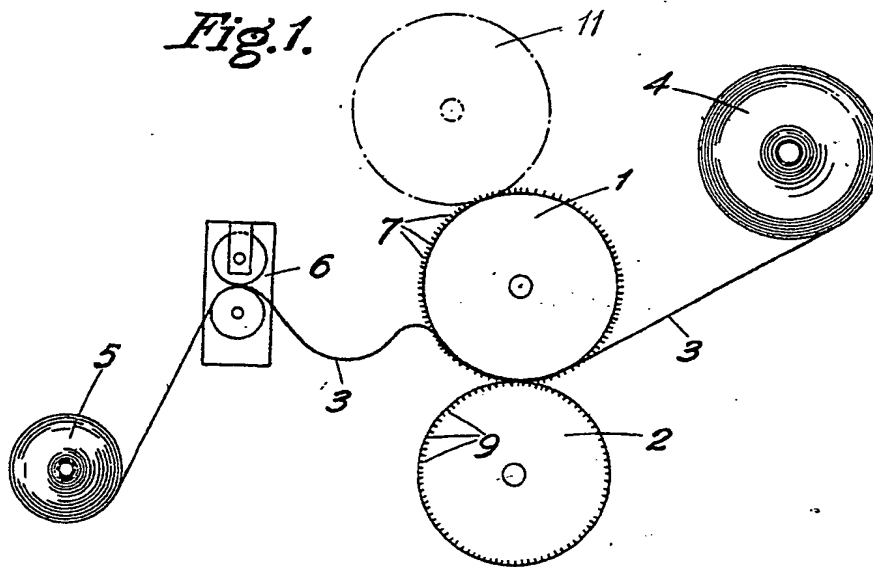
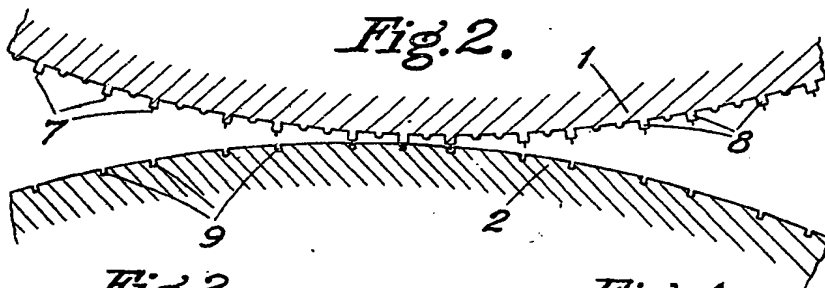
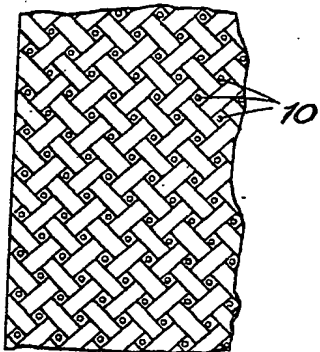
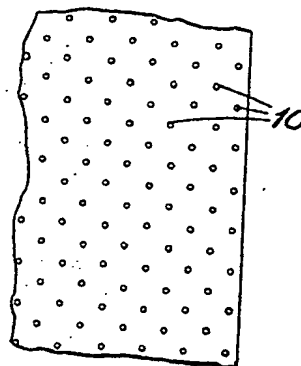
Having now particularly described and ascertained the nature of our said invention, and in what manner the same is to be performed, we declare that what we claim is:—

1. Method of making patterned sheeting of plain rubber which comprises introducing the sheeting in its semi-plastic state between a pair of dies, one of which carries perforating pins and the other corresponding recesses to receive the pin ends, whereby the sheeting is perforated with moulded holes, and simultaneously applying to one of the (or both) sides of the sheeting an ornamental or other pattern by means of an appropriate engraved or other relief design formed on one of the (or both) dies, the sheeting being subsequently vulcanised, or partially or wholly vulcanised whilst between the dies.

2. A patterned and perforated sheet of single ply plain rubber when prepared by the method according to Claim 1.

Dated this 7th day of September, 1937.

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*Fig.1.**Fig.2.**Fig.3.**Fig.4.*

[This Drawing is a reproduction of the Original on a reduced scale.]